Journal of Monetary Economics 23 (1989) 31–51. North-Holland

# INTERPRETING NEW EVIDENCE ABOUT CHINA AND U.S. SILVER PURCHASES*

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Received August 1987, final version received August 1988

This paper offers a reinterpretation of the influence on China of America's silver policy in the early 1930's. Recently compiled evidence about events in China are described and interpreted in light of a model of free banking under a commodity standard. Our interpretation is that the U.S. silver purchase program did not set off a chain of bad economic events which eventually forced China off silver and onto a fiat standard. Rather, China was forced off silver by its own government, which wanted to make itself the beneficiary of the capital gain associated with the appreciation of silver and to relieve itself of the restrictions that are imposed on government finance by a commodity standard.

## 1. Introduction

In the view of Friedman and Schwartz, China's adherence to a silver standard insulated it until about 1931 from the deflationary monetary disturbances that impinged on gold standard countries from 1929 to 1931. However, in 1931, Britain depreciated the pound against gold. Then in 1933, the United States depreciated the dollar against gold, and also began a silver purchase program whose consequence was to double the price of silver within three years. Friedman and Schwartz describe these measures, especially the U.S. silver purchase program, as setting off a deflationary process in China, in which a contraction of the money supply in China was a key link in a chain of causation originating with the U.S. policy toward silver. The money supply contraction in China was said to be caused by the drain of silver from China

*This paper was completed while Brandt was a National Fellow at the Hoover Institution. An earlier version was presented at the 27th Annual Cliometrics Conference, May 1987. For very helpful and detailed comments, we are grateful to Milton Friedman, Thomas Rawski, Arthur Rolnick, Anna Schwartz, and Eugene White. Sargent's research was supported by National Science Foundation Grant NSF/SES8508935 to the University of Minnesota.

that occurred in response to silver's appreciation. Friedman and Schwartz emphasize that it is a quantity-of-money effect, and not simply a relative price effect, to which they assign principal importance:

> 'The owners of silver benefited, of course, from the high foreign exchange value of silver. Had silver been simply a commodity, the U.S. purchase program would have been a largely unalloyed boon, enabling the holders of silver to sell their stocks of silver at an unexpectedly high price. Because silver served as the monetary base of China, however, students of the period are unanimous that the boon was more than offset by the economic effects of the drastic deflationary pressure imposed on China and the resulting economic disturbances.' [Friedman and Schwartz (1963, p. 490)]

Friedman and Schwartz describe the monetary mechanism by which an appreciation of silver in the world market induced monetary contraction and deflation in China:

> 'The initial pressure was, of course, felt as a decline in exports relative to imports. The potential deficit in the balance of payments was met by export of silver, which in its turn tended to contract the internal money supply. The pressure was somewhat eased by the availability of minor copper and nickel coinage which could change in value relative to silver, but it is doubtful that the offset was of major significance.' [Friedman and Schwartz (1963, pp. 489–490)]

Friedman and Schwartz's interpretation is an official one. The Emergency Decree of November 3, 1935, in which the Chinese government nationalized the monetary silver stock and instituted a fiat currency, began with these words:

> 'With the abandonment of the gold standard in recent years by many leading nations, and the rapid rise in the world price of silver, our currency has become seriously affected, resulting in severe internal deflation, with growing unemployment, widespread bankruptcies, flight of capital abroad, fall in government revenues, and an adverse balance of payments. For the three and a half months commencing July, 1934, exports of silver amounted to more than 200 million dollars, and it was evident that unless immediate measures were taken, the country would be drained of its silver stock.' [Chinese Yearbook (1936–1937, p. 810)][1]

[1]See the section titled 'Banking and Currency' in the *Chinese Yearbook, 1936–1937*, especially pp. 803–805, for a contemporary Chinese account of events in China which agrees with Friedman and Schwartz's. The analysis is that of F.Y. Chang, who was the Director, Bureau of Research, Bank of China.

The present paper summarizes some recently compiled evidence about events in China which was not available to Friedman and Schwartz. This evidence indicates, first, that the total Chinese money supply did not decline but continued to grow rapidly following the U.S. silver purchase; second, that Chinese aggregate economic activity did not suffer marked or prolonged depression; and third, that there was no widespread contagion of banking panics in China during the first half of the nineteen thirties.

This evidence is sufficiently inconsistent with important aspects of Friedman and Schwartz's interpretation that we have been prompted to offer an alternative interpretation of the observations. Our interpretation differs most significantly from Friedman and Schwartz's in positing a shorter causal chain extending from the rise in the international price of silver to a fall in the Chinese price level, a chain which did not require or involve a fall in the supply of money in China. We interpret the observations on the Chinese price level and the money supply in light of a model of a free banking regime under a commodity standard, a model under which increases in the supply of money (consisting largely of small denomination evidences of intermediated private indebtedness) need not lead to increases in the price level. It is our view that the banking system of China in the early 1930s approximated a version of free banking.[2]

The remainder of this paper is organized as follows. Section 2 briefly describes some observations about the economy of China in the 1930's and our interpretation of them. In order to get our reconstruction of Friedman and Schwartz's interpretation on the table as quickly as possible, section 2 only sketches the observations, postponing more detailed accounts to subsequent sections. Sections 3–6 are devoted to describing the observations in more detail.

## 2. Reconstructing China's macroeconomy, 1930–1935

There are three broad classes of observations that seem to require modifications of Friedman and Schwartz's account. First, Thomas Rawski's (1984) recently constructed annual time series for the Chinese money supply display continual and rapid growth for the entire period 1929–1935. It is true that silver currency contracts after 1931 and especially after 1933, but the growth of private bank notes and deposits accelerates more than enough to make up for the decline in specie in circulation. The situation in China is much the opposite from what was occurring simultaneously in the United States, where the monetary base increased continually from 1929–1933, while the 'inside' component of the money supply contracted. In China, the silver coinage,

[2]For a review and evaluation of recent empirical and theoretical literature on free banking, see Rockoff (1986). For studies of the U.S. experience under a version of free banking, see Rolnick and Weber (1983, 1984, 1985).

which served as one major component of base money contracted, but 'inside money' expanded during the years after 1931. The expansion in the nominal money supply is all the more remarkable in view of the fact that the price level in China did decline substantially. Rawski's observations are puzzling from the perspective of Friedman and Schwartz's account, both directly because they contradict the role assigned to the money supply collapse as an intermediate causal link between the rise in the silver price and fall of the Chinese price level, and also indirectly because a rapidly rising inside component of the money supply is usually regarded as a signal of growing financial intermediation between borrowers and lenders, which is usually associated with strong commercial and industrial activity.

Second, the available direct observations on aggregate levels of real economic activity show that the years after 1931 were not especially depressed. The best evidence that we have shows that industrial output actually expanded over these years. This evidence is corroborated indirectly by the rapidly expanding volume of private loans and investments in the portfolios of leading private banks.[3]

Third, although there were numerous bank failures, there was no widespread panic or sequence of bank runs. Unlike experience in the United States, banks in China were able by and large to continue freely converting their evidences of indebtedness into silver, despite the fall in the price level. Banks' loan and investment portfolios actually expanded, even in nominal terms, unlike the experience in the United States from 1929–1933.

Before November 1935, China was without an effective central bank and had operated more or less under free banking.[4] The absence of a central bank and the general absence of effective government financial regulation is signifi-

[3]There exist impressionistic accounts by contemporary observers that contradict the direct statistical evidence on real economic activity that we shall describe in tables 5–7 below. An example is the account offered by British observer Arthur Salter. Salter's *China and Silver* (1934) predicted that the U.S. silver purchase program would have very much the same effects on China's monetary system, price level, and real economic activity that Friedman and Schwartz described. However, our review of the entire body of impressionistic evidence available to us, based on readings of contemporary Chinese newspapers, and the English language press in China convinces us that the body of such evidence is less consistent with accounts like Salter's than it is with the portrait painted by the evidence in tables 5, 6, and 7.

[4]Among the most important banks were three that were under full or partial ownership by the government. There was the Central Bank of China (chartered in 1928), which was owned by the government. The Bank of China (funded in 1912 and rechartered in 1928) and the Bank of Communications (funded in 1907 and rechartered in 1928) were 20 percent government-owned. Before November 1935 the Central Bank of China was not effectively a central bank. It did not possess a monopoly of notes issued. Other banks issued notes on the same terms that it could. Bank notes were subject to a 100 percent reserve requirement, at least 60 percent of which had to be met by holding 'cash' which consisted of silver, foreign exchange, or gold, and 40 percent of which could be met by holding government securities. There were no legal reserve requirements on banks' deposit accounts. The Central Bank of China offered no pretense of being a 'lender of last resort'.

cant in shaping our interpretation of events before November 1935. Private banks issued bank notes, which the banks promised to convert into silver.[5] There was no explicit government supplied deposit insurance. There was no central bank supplying a form of implicit deposit insurance by promising to fulfill a 'lender of last resort' function, as in the United States. Adherence to the silver standard was not accomplished through government decisions or guarantees, but emerged from the operating rules of the private Chinese banks. Indeed, the central government had on occasion, as in 1928, attempted to force private banks to suspend convertibility of their notes into silver, but the banks had been sufficiently powerful to resist that pressure. The government of China had moved to substitute a fiat currency for silver before 1935, but had been insufficiently powerful to achieve its objective. Adherence to the silver standard in China was thus the result of an interaction between the decisions of private banks and their customers and was maintained by bank operating rules in the 'real bills' tradition. The large Chinese banks had portfolios consisting partly of government securities but chiefly of loans to finance inventories. Those inventory loans were granted primarily on the security of commodities deposited in warehouses of the lending bank or on the receipt of commodities deposited in other warehouses.

Everyone in China before November 1935 knew that the private banks issued liabilities that were not insured. There is at least some reason to suppose that this state of affairs made the liabilities of the Chinese banks safer than they would have been had people been led to expect that a 'lender of last resort' would insure them. When banks are managed in the interests of their shareholders, a believed government promise to lend on terms unavailable on the private markets (that is what 'lender of last resort' means) encourages the banks to undertake riskier loans than they would in the absence of such unpriced deposit insurance.[6] It has been occasionally argued that this happened in the U.S. in the 1920's and that bank portfolios became riskier in response to the presence of the Federal Reserve. But in China the private banks were on their own.

Sargent and Wallace (1982, 1983) have analyzed some models of free banking under commodity standards which are capable of mimicking the pattern of price–money supply correlations observed in China in the early nineteen thirties. Sargent and Wallace's models can be viewed as formalizing Adam Smith's vision of how a banking system under a commodity standard would

[5]Bank notes were denominated in 'yuan'. Before 1933, bank notes were issued on the basis of the silver yuan coin minted according to the Regulations of 1914. This silver yuan weighed 27 grams and had a fineness of 88 percent. In March of 1933 a new monetary unit, the standard yuan, was introduced. It weighed 26.6971 grams and had a fineness of 88 percent silver and 12 percent copper [Tamagna (1942, p. 140)]. This made one yuan convertible into 0.8166 standard ounces of silver or 0.7553 fine ounces.

[6]See Kareken and Wallace (1978) and Merton (1978).

operate. It is useful at this point to summarize briefly Adam Smith's analysis and to indicate how it seems to capture important elements of what was occurring in China.

Adam Smith considered a small country on the gold standard that had previously prohibited private banks from issuing notes and which used specie as currency.[7] Smith studied what would occur if the government relaxed its restrictions against private intermediation and permitted banks to issue notes that were convertible into gold on the security of safe evidences of private indebtedness ('real bills'). Smith determined that the price level in the country would be unaffected by such a move to free banking, by virtue of the small country assumption. In other words, the price level in the country would be determined by commodity price arbitrage internationally. According to Smith, permitting free banking would permit the country to reap a one-time windfall by substituting convertible paper in exchange for a physical commodity as its currency. The gold could be exported, a temporary balance of payments deficit being incurred, which would finance a one-time increase in real consumption or physical investment in the country. The consumption–investment dividend was Smith's reason for advocating free banking.

With some modifications, Smith's analysis seems to describe events in China.[8] China was already on a free-banking version of a commodity standard before 1931, so that the experiment is somewhat different than the one that Smith used. But a version of Smith's analysis would say that in response to an international appreciation in the price of silver, there would occur a fall in the Chinese price level, proportionate to the rise in the international price of silver, and a fall in the Chinese stock of silver just sufficient to keep constant the real stock of outside money in China. The fall in the Chinese price level would be enforced by international commodity arbitrage. The stock of silver would be diminished via silver exports, as the lower price level would permit a smaller silver stock to support an unaltered level of 'real balances' of outside money. The resulting temporary balance of payments deficit would be China's reward, a temporary dividend of additional resources either to consume or to invest.[9]

This reasoning shares with Smith's analysis the roles assigned to international commodity arbitrage and convertibility into specie of bank notes and deposits in determining the domestic price level and also the interpretation of an export of specie as a real dividend. However, there are two important

[7]See Smith (1776, pp. 300–310). See Milton Friedman (1960, ch. 1) for a set of arguments against Smith's advocacy of free banking. Also see Friedman and Schwartz (1986) for further discussion on free banking.

[8]The verbal argument in this paragraph can be formalized in terms of models described by Sargent and Wallace (1982, 1983).

[9]China's merchandise trade balance was in deficit every year after 1876. Prior to the 1930's this deficit and treasury (silver and gold) import were financed by overseas remittances and net foreign investment in China. Between 1933 and 1936 export of silver was the primary balancing item.

respects in which the Chinese experience differed from the conditions of Smith's experiment. First, the price level was not fixed in China. Second, the stock of inside money actually expanded in China, both in real and in nominal terms. We now briefly discuss each of these deviations from Smith's conditions.

With respect to the price level, in order to apply Smith's reasoning to China, his argument needs to be supplemented with some assumptions about the Phillips curve.[10] Smith did not require any such assumptions, because the experiment that he analyzed was one in which the price level was found to be identical in the two positions being considered. The exogenous movement which defines our experiment is an appreciation of the world price of silver, which sets off a dramatic decline in the Chinese price level. The only interpretation which seems consistent with the data on output is that there was little or no Phillips curve tradeoff between inflation and output growth in China.

That the apparent Phillips curve tradeoff between inflation and output growth was not adverse can be explained by examining some of the features that macroeconomic theories of that tradeoff direct us to. One such factor is the duration of nominal contracts and the existence of mechanisms for rapidly and smoothly adjusting them in response to nominal disturbances. The duration of contracts appears to have been generally quite short. Bank loans were typically commerical in character and were often secured by inventories. At the village level, there appears to have been mechanisms for haggling and adjusting loan payments in the event of a crop failure or, one would think, an appreciation in the value of currency. There were some long-term real estate loans, especially in Shanghai, and banks issuing these did run into problems when the price of real estate collapsed. A number of such banks failed. (Note that the fact that they eventually failed to pay their nominal obligations did not mean that their depositors necessarily suffered negative real rates of return on their deposits.) The weight of evidence, fragmentary as it is, suggests that the average duration of nominal contracts in China was probably very short. In macroeconomic models like John Taylor's (1979, 1980a, 1980b) in which contract duration determines the Phillips curve tradeoff, having a short contract duration minimizes exposure to an adverse Phillips curve.

[10]The theoretical issues are laid out by Friedman (1968), Lucas (1972), and Taylor (1979, 1980a, 1980b). The argument in the text takes it for granted that the drop in the price level in China, at least initially, was unexpected and thereby abstains from invoking the 'natural rate' mechanism of Friedman and Lucas, in which foreseen reductions in the price level have no effects on real economic activity and thus lead to no Phillips curve correlations. Assuming that the contraction was initially unforeseen prompts one to search for explanations among the list of factors that Lucas and Taylor indicate might affect the response to unexpected reductions in the price level. If one assumes that the price level drop was foreseen, it becomes easy to explain the lack of a Phillips curve along the lines of the 'natural rate' theory. As noted in footnote 12 below, assuming that the reduction in prices was foreseen could help in one other direction, namely, in reconciling the large observed increase in balances with the hypothesis of a demand function for money that is a stable function of incomes and expected inflation.

Another feature that may have contributed to the apparent lack of strong adverse Phillips curves effects was the absence of any hint of government deposit insurance. In such a situation, one would expect private institutions to adjust in a way to minimize the exposure to risks of price level fluctuations.

The second deviation from Smith's conditions was the expansion of inside money that accompanied the falling price level. Not only did real balances rise, but so did nominal balances. Such an outcome could occur if, superimposed on top of the falling price level, there was a force for growing intermediation in the Chinese economy.[11,12] Two components of such a force seemed to have been very active in China in the early thirties. First, banks took an increasingly active role in intermediating Chinese government securities. Banks bought government securities in increasing quantities, using them as reserves upon which they issued bank notes convertible into silver. Second, and quantitatively more important, banks increased their portfolios of commercial and industrial loans, using them as 'backing' for deposits that were convertible into silver. The growth of private intermediation reflected the growing commerce and industry of the period. This increase in the demand for private intermediation was accommodated by both an expansion of existing banks and an increase in the number of banks.[13] As far as we can determine, until 1935, bank loans both to the government and to private firms were made along conservative lines designed to assure that convertibility of notes and deposits was maintained. In particular, there is ample evidence that, before 1935, government debt purchased by the banks was backed by tax liabilities specifically earmarked for servicing that debt.

## 3. The money supply in China and its backing

Table 1 records price indexes and documents the Chinese deflation after 1931. Prices began to fall in mid-year 1931 and bottomed out in the fall of 1935 at a level more than a third lower than they had been just four years earlier. Table 2 presents Thomas Rawski's estimates of the Chinese money

[11]The model of Sargent and Wallace (1982) can be used to produce this effect by altering endowments so as to increase the amount of borrowing and lending, and consequently, the amount of 'inside money'.

[12]If the deflation in Chinese prices is regarded as having been largely foreseen, then the observed increase in real balances could be regarded as simply reflecting a movement along a stable function expressing the demand for money (inside *plus* outside money) as a stable inverse function of the expected rate of inflation. In a letter to us, Milton Friedman calculated that, even assuming no decline in income in China, such an explanation would require a very large negative value of the elasticity of demand for money with respect to expected inflation, a value substantially larger than those usually estimated for other countries.

[13]According to *Ch'uan-kuo yin-hang nien-chien* (1936, pp. A2–3), between 1931 and 1936, 84 new banks began operation, 11 of which had suspended operations by 1936. Over the same period the number of branches increased by more than 300.

Table 1

Wholesale price indices for select urban centers.[a]

| Year | Shanghai | Tientsin | Canton | Nanking | Hankow | Tsingtao | Changsha |
|---|---|---|---|---|---|---|---|
| 1929 | 104.5 | 111.0 | 96.7 | | | | |
| 1930 | 114.8 | 115.9 | 101.4 | 100.0 | 100.0 | 100.0 | |
| 1931 | 126.7 | 122.6 | 112.6 | 106.1 | 114.5 | 107.6 | 104.3 |
| 1932 | 112.4 | 112.9 | 113.0 | 100.8 | 112.4 | 103.6 | 103.5 |
| 1933 | 103.8 | 100.6 | 102.6 | 92.2 | 98.9 | 94.9 | 83.6 |
| 1934 | 97.1 | 91.8 | 94.3 | 80.6 | 89.0 | 86.9 | 80.1 |
| 1935 | 96.4 | 95.4 | 84.6 | 80.4 | 89.3 | 89.4 | 87.5 |
| 1936 | 108.5 | 110.6 | 105.4 | 84.8 | 97.2 | 93.4 | 94.2 |

[a]Source: *T'ung-chi yue-pao*, No. 32, June 1937, p. 17.

In the construction of these indices, neither the same base year, commodities, or weights were used. The indices for Shanghai, Tientsin, and Canton all take 1926 as the base year, while 1930 is used for Nanking, Hankow, and Tsingtao. For Changsha June 1931 = 100. The number of commodities used varied between one and two hundred.

Table 2

China's money supply, 1910–1936 (year-end totals, million yuan).

| | Silver | | Copper | Bank notes | Bank deposits | Rawski's money supply | | Revised money supply | |
|---|---|---|---|---|---|---|---|---|---|
| Year | (1A) | (1B) | (2) | (3) | (4) | (5A) | (5B) | (6A) | (6B) |
| 1910 | 880 | 1934 | 413.7 | 114.3 | 807.4 | 2215.4 | 3269.4 | 2114.5 | 3168.5 |
| 1915 | 1035 | 2089 | 382.2 | 209.7 | 786.5 | 2413.4 | 3467.4 | 2256.1 | 3310.1 |
| 1920 | 1225 | 2279 | 350.7 | 282.2 | 1242.9 | 3100.8 | 4154.8 | 2881.4 | 3935.4 |
| 1925 | 1581 | 2635 | 319.2 | 547.5 | 1985.5 | 4433.2 | 5487.2 | 4025.3 | 5106.3 |
| 1930 | 2200 | 3254 | 287.7 | 956.3 | 3392.1 | 6836.1 | 7890.1 | 6126.6 | 7180.6 |
| 1931 | 2271 | 3325 | 281.4 | 896.9 | 3591.5 | 7040.8 | 8094.8 | 6359.0 | 7431.0 |
| 1932 | 2289 | 3343 | 275.1 | 924.4 | 3880.8 | 7369.3 | 8423.3 | 6659.5 | 7713.5 |
| 1933 | 2275 | 3329 | 268.8 | 978.8 | 4290.6 | 7813.2 | 8867.2 | 7054.3 | 8108.3 |
| 1934 | 1995 | 3049 | 262.5 | 1108.9 | 4620.9 | 7986.5 | 9040.5 | 7136.4 | 8190.4 |
| 1935 | 1703 | 2757 | 256.2 | 1413.5 | 5460.1 | 8832.8 | 9886.8 | 7766.3 | 8820.3 |
| 1936 | 1391 | 2445 | 250.0 | 2438.6 | 6394.2 | 10473.7 | 11527.8 | 9009.9 | 9823.9 |

[a]Source: Thomas Rawski, 'Estimates of China's Money Supply, 1910–1936', p. 43.

Rawski reports two alternative estimates of monetary silver stocks, labeled A and B. His estimates of the money supply are given in columns 5A and 5B, which equal columns 1A(B) + 2 + 3 + 4. Columns 6 incorporate two further refinements. First, banks were required to hold 60 percent reserves in the form of silver and foreign exchange behind their note issue, a fact that Rawski doesn't account for in adding 1 and 3 (there is double counting). We subtracted 60 percent of the note issue from column 5 to eliminate this problem. Since in the 1930's an increasing percentage of reserves appears to have been held in foreign exchange, it is likely that for these years our adjustment over-corrects for the double counting in column 5. Second, Rawski's series on bank deposits also includes inter-bank deposits which should not be included in the monetary aggregate. In 1936, the only year for which we have information on inter-bank bank deposits for all Chinese banks, these deposits amounted to approximately 4 percent of total bank deposits. We have also subtracted 4 percent of deposits as reported in column 4 from column 5 to arrive at the final estimates in columns 6. Data on inter-bank deposits are taken from K'o yin-hang yin-k'ung-szu hsin-t'uo-kung-szu ch'u-hsu hui, *Er-shih-wu-nian-tu ying-yeh pao-kao t'ung-chi*, table between pp. 24 and 25.

supply and its components over the period we are studying. The figures reveal that, while monetary silver stocks declined after 1932, the nominal stocks of bank notes and bank deposits increased by more than enough to send the total money stock upward each year after 1930.[14]

In the mid-1930's there were approximately 160 'modern' domestic banks in China with over 1300 branches. The banks were permitted to issue their own currency and to accept deposits. Before the 'reform' of 1935 bank notes were subject to a 100% reserve requirement, at least 60% of which had to be held in the form of silver, foreign exchange, or gold (so-called 'cash'). The remaining 40% could be met by holding government securities. There were no reserve requirements on deposits.[15]

Monthly audit reports confirm that reserve requirements were consistently met and that between 1931 and 1935 a stable proportion of approximately 35% of bank reserves against notes was met by bank holdings of government securities [Ch'uan-kuo yin-hang nien-chien (1934, 1935, 1936)]. Data for two of the four largest banks, the Bank of China and the Bank of Communications, show that between 1932 and 1935 silver stocks as a percentage of note issue declined from 49.5% to 21.3% [Tamagna (1942, p. 139)]. Presumably, foreign exchange (or perhaps gold) increased to make up the deficiency.

The stock of bank notes issued by domestic banks in China proper increased from 538 million yuan in 1932 to 1,032 million in 1935.[16] Since the percentage of cash reserves seems to have remained about constant, bank holdings of government bonds had to have increased over this period in order

[14]In light of the changing structure of China's banking sector, it is important to note here that Rawski's series includes the deposits of foreign banks and both kinds of domestic banks (traditional or native and modern) and the note issue of modern and foreign banks. The only possibly serious omission is the direct note issue by traditional banking institutions for which data are very poor; indirect note issue by the latter through the agency of modern banks is included however. Rawski argues on the basis of fragmentary evidence that the note issue by native banks amounted to a relatively small percentage of the money supply, leading us to believe that any bias introduced by such an omission is relatively minor. Even under the assumption that the ratio of banknotes to deposits was the same for traditional banks as it was for modern banks, the decline in bank deposits in traditional banks between 1933 and 1936 would imply an overestimate in the growth of the money supply (because of the omission of notes issued by traditional banks which was probably declining) of only 40 million yuan.

[15]The reserve requirements on bank notes made the Chinese system fall short of being one of pure free banking, permitting completely unfettered intermediation. The Chinese system fell somewhere in between a pure free banking system with zero reserve requirements on notes and deposits and, for example, the National Banking System that prevailed in the U.S. between 1863 and 1914. Under the National Banking System, City Banks had to hold 25 percent reserves behind their aggregate issue of notes and deposits, while other banks had to hold 15 percent reserves behind notes and deposits. (Reserves consisted of specie, greenbacks, and clearing house certificates.) In addition, issues of national bank notes had to be backed by holdings of certain specified eligible interest bearing U.S. Treasury securities. During the free banking era in the U.S. preceding the Civil War, notes of state chartered banks typically had to be backed by holdings of state issued bonds. For an analysis of the free banking experience in the U.S., see Rolnick and Weber (1983, 1984, 1985).

[16]The difference between these estimates and those reported in table 2 is the note issue of foreign banks operating in China.

to fulfill the reserve requirement behind notes. Several sources estimate bank holdings of government securities to be 400 million yuan in 1935, which is consistent with Rawski's estimate of note issue by domestic banks and the estimate in the preceding paragraph of 35 percent of reserves against notes being held in the form of government securities.

We are interpreting the data with a model in which a bank note or deposit is regarded 'as good as silver'. This requires that the 'backing' behind the note or deposit, that is, the assets in the bank's portfolio, be valuable enough to support the promise of convertibility. This view directs our attention to the quality (riskiness) of the assets in banks' portfolio. Before we examine these assets, we note that there is an obvious source of direct evidence. The most important evidence for the credibility of a bank's promise to maintain covertibility is probably its subsequent record of keeping its promise. By and large, the promise was kept. Tamagna (1942, p. 141) reports: 'Little, if any, conscious and effective effort for a monetary policy was exercised by the Government banks before 1934. Up to that time the banks limited themselves to a most conservative policy of currency management; consequently, their notes gained the confidence of the people and were freely circulated at par with silver.' (We shall shortly describe the modifications imposed on banks' operating rules by the government in 1934 and 1935.)

One potential source of concern about the banks' portfolios was the approximately 35 percent of the reserves behind the note issue that was held in the form of government securities. Is a government bond a 'real bill'? The theoretical answer is that it all depends on the scheme for servicing government securities. Only if there is a firm prospect that sufficient future taxes will be levied in order to service the debt does government debt qualify as a real bill. Many countries with central banks that have adopted commodity standards have also adopted strict restrictions on the central bank's holdings of government debt out of fear that access to government loans would threaten both the quality of that debt and the commitment to the monetary standard.

There is no doubt that soon after the monetary reform of November 1935 Chinese government debt ceased to qualify as 'real bills'. Indeed, a major impetus for the monetary reform was to relieve government finance from the constraints imposed upon it by any requirement to back its liabilities with future taxes or other assets. In light of the subsequent great inflation and associated defaulting on government debt, it is important to keep in mind what the prospects had been before the monetary reform. During the late 1920's and early 1930's the Nationalist Government (which came to power in 1927) embarked on a deliberate program to earn good credit for itself in private markets[17] and the market reacted favorably to the government's

[17]Lucas and Stokey (1983) characterize some of the benefits that accrue to a government that makes good on its commitments to service its debt. See also the passage from Alexander Hamilton (1795) that is cited by Lucas and Stokey. Note that the Chinese government was executing a version of the policy recommended by Hamilton.

program. This included a policy of servicing external bonds that had been issued by previous regimes and that were in arrears. For example, late in 1929 the Minister of Finance announced a schedule for paying the arrears of the Salt Loans, both interest and principal. By the end of 1930 payment of all arrears of interest on the Anglo–French Loan of 1908 and the Crisp Loan of 1912 were completed. In 1931 payment of arrears for service of the Hukuang Loan were completed. The principal on the Anglo–French Loan was retired in October of 1934. In December 1934 the government paid the 1928 installment on the Crisp Loan and in January 1935 the government announced a schedule for further repayments. Similar steps were taken regarding settlement of arrears of the various railway loans.

With respect to new issues, the Nationalist Government endeavored to make its securities real bills by concretely backing them with prospective taxes. 'In each case where a loan was floated, a definite, reliable source of revenue was earmarked as security for the loan. The solid basis of this loan service system is shown by the fact that throughout the years the principal and interest payments of various domestic loans have always been fully and regularly met, usually leaving ample balances in the hands of the Sinking Fund Commission.' [Chinese Yearbook (1936–37, p. 717)]. The two major sources were revenues from the British-dominated Imperial Maritime Customs and the Salt Tax. It is, no doubt, actions of this sort that prompted the Internal Bondholder's Association to proclaim in 1936: 'The efforts of the Government to maintain (the credit of its bonds) despite the various financial difficulties at the present juncture are praiseworthy, and the bondholders have benefitted especially from the policy of the Government to strengthen the credit of its bonds.'[18]

The consequence of these policies was that government bond prices, both external and internal, increased throughout most of the early 1930's. In 1936 the Ministry of Finance was able to issue a report quoting the Finance Minister as stating:

> 'It is gratifying that notwithstanding untoward events, the prices of domestic bonds have materially improved during the periods under review. Likewise, the prices of external issues have risen considerably. From 12/15/32 to 2/25/35, the quotation from the 5% Reorganization Loan of 1913 increased from 77 to 99.75, and the 4 and 1/2% 1898 Loan from 97.5 to 105 and the 1908 4 and 1/2% Anglo–Franc Loan from 73 to 99.75. It is particularly gratifying that the 4 and 1/2% 1898 loan due in 1943 has recently been selling above par.' [Ministry of Finance, *Report for the 23rd Fiscal Year* (1936)]

[18]Table 3 in the text records estimates of the Nationalist Government's budget deficit. The government ran a net of interest surplus throughout the period, implying that its outstanding stock of debt was decreasing.

Table 3

Central government budget data (in million yuan).[a]

| Year | Expenditure (1) | Loan and indemnity service (principal and interest) (2) | Debt retired (principal repayments) (3) | Receipts (4) | Gross of interest deficit (1–4–3) (5) | Net of interest deficit (1–4–2) (6) |
|---|---|---|---|---|---|---|
| 1929/30[b] | 584 | 200 | | 483 | | −101 |
| 1930/31 | 774 | 290 | 150 | 557 | 67 | −73 |
| 1931/32 | 749 | 270 | 160 | 619 | −30 | −140 |
| 1932/33 | 699 | 210 | 100 | 613 | −14 | −124 |
| 1933/34 | 836 | 244 | 115 | 689 | 32 | −97 |
| 1934/35 | 941[c] | 238 | 125 | 745 | 71 | −42 |
| 1935/36 | 1073 | 294 | NA[d] | 817 | NA | −38 |
| 1936/37 | 1168 | 305 | NA | 870 | NA | −1 |

[a]Source: *Chinese Yearbook, 1935–1936*, pp. 1192–1237; *Chinese Yearbook, 1936–1937*, pp. 587–588; Arthur Young, *China's Nation-Building Effort, 1927–1937* (Stanford, 1971, pp. 433–440).
[b]Fiscal years ending on June 30.
[c]Includes 73.5 million of capital items, which was the net amount of the funds provided by the government for bank capital in 1935.
[d]Not available.

This evidence seems to us to validate an interpretation according to which government debt could reasonably be regarded as 'real bills' from the point of view of serving as reserves for currency. The substantial growth of bank notes occurring in the early 1930's was accompanied *pari passu* with an expansion in banks' holdings of government securities. The Annual Report of the Ministry of Finance reported that the accumulated balances of bank loans and overdrafts obtained by the government stood at 390 million yuan on June 30, 1935. At the end of 1935 the total value of all loans, discounts, and overdrafts made by China's modern banks was 3,200 million yuan, so that government securities still constituted on the order of an eighth or a seventh of backing for monetary instruments in 1935.

As mentioned above, there were no reserve requirements on deposits. We have seen only fragmentary evidence on the portfolios of the banks and so have only a very imperfect idea of the assets that backed the deposit liabilities of banks. For the most part, it seems that the banks tried to restrict their portfolios to short-term, relatively safe loans. They discounted bills of exchange and extended short-term credits to commerical and industrial enterprises on the security of physical commodities that were actually deposited in warehouses that were owned by the banks. We don't know precisely how prevalent such 'warehousing' was in aggregate terms, but we believe it to have been pervasive. For example, in the early 1930's more than half of the loans made by the Kincheng Banking Corporation, one of the largest private banks, were of this type.

Table 4

Predicted and actual changes in wholesale prices.[a]

| Year | %ΔWPI, US, $[b] (1) | %Δ $/Yuan[c] (2) | (1 − 2)[d] (3) | %ΔWPI, S, Yuan[e] (4) |
|---|---|---|---|---|
| 1926/27 | −4.6 | −9.2 | +4.6 | +4.4 |
| 1927/28 | +1.4 | +2.9 | −1.5 | −2.3 |
| 1928/29 | −1.4 | −9.9 | +8.5 | +2.8 |
| 1929/30 | −9.3 | −28.1 | +18.8 | +9.9 |
| 1930/31 | −15.5 | −26.1 | +10.6 | +10.3 |
| 1931/32 | −11.2 | 0.0 | −11.2 | −11.3 |
| 1932/33 | +1.7 | +20.7 | −19.0 | −10.5 |
| 1933/34 | +13.7 | +28.1 | −14.4 | −8.6 |
| 1934/35 | +6.8 | +7.2 | −0.4 | −0.8 |
| 1935/36 | +1.0 | −18.6 | +19.6 | +15.0 |

[a]Source: Data on wholesale prices in the United States are taken from U.S. Bureau of the Census, *The Statistical History of the United States from Colonial Times to the Present* (New York, 1965); exchange rate data are from Liang-lin Hsiao, *China's Foreign Trade Statistics, 1864–1949* (Cambridge, 1974, pp. 190–192); wholesale price data for Shanghai can be found in *Shanghai chieh-fang ch'ien-hou wu-chia tzu-liao hui-pien* (Shanghai, 1958, pp. 91–92).

[b]Percentage change in wholesale prices in the U.S.

[c]Percentage change in the exchange rate between the U.S. dollar and the yuan.

[d]Predicted change in wholesale prices in Shanghai.

[e]Actual change.

This concludes our summary of the evidence, fragmentary as it is, that leads us to interpret the Chinese banks as having managed their portfolios in ways designed to insure convertibility of their notes and deposits into silver. Convertibility of notes and deposits into silver is one pillar of our interpretation of the Chinese price and monetary data; international commodity arbitrage is the other, to which we now turn.

## 4. International commodity price arbitrage

Extensive evidence has been organized by Loren Brandt,[19] which shows that international commodity arbitrage served to determine yuan prices in China of cotton, rice, wheat, silk, and tea. Aside from these agricultural commodities, there is also qualitative evidence that international commodity price arbitrage was effective in markets for soybeans, peanuts, rapeseed, sesame, tobacco, and sugarcane. Together these crops accounted for more than 70 percent of China's agricultural output. There is also reason to believe that commodity price arbitrage was at work for textiles, kerosene, cement, and other key nonagricultural commodities. Even though for most of these commodities the

[19]Chapters 2 and 3 of a forthcoming book examine the influence of the international economy on late 19th, early 20th century Chinese agriculture. An earlier version of some of this material appeared in Brandt (1985).

percentage ever imported or exported was quite small, commodity price arbitrage seemed to be pervasive.

We rely on Brandt's evidence to support our interpretation that, until the government interventions in monetary affairs in 1934 and 1935, general price changes in China were the product of changes in the world price level and changes in the world price of silver. Here we briefly supplement Brandt's evidence with the 'purchasing-power-parity' calculations recorded in table 4. The first column is the percentage change in the wholesale price index in the U.S., while the second is the percentage change in the exchange rate measured as the price in U.S. $ of the Chinese yuan. The third column is the PPP prediction of the percentage change in Chinese prices, while the fourth column is the actual percentage change in a Shanghai wholesale price index. The fit between columns 3 and 4 is not too bad.

## 5. Estimates of real economic activity

Conventional wisdom has it that the period of the early- to mid-1930's was marked by a severe contraction in real economic activity in China, much as it was in the West. Recent estimates of gross domestic product by K.C. Yeh for the period between 1931 and 1936 provided in table 5 belie this and show that these years were not especially depressed.[20] In fact, despite episodic reversals, these data indicate cumulative growth in real GDP averaging 1.5 percent per annum. Moreover, the sharp contraction in output observed in 1934 is primarily an agricultural phenomenon: farm output fell by almost 12 percent because of a major crop failure in North China, while output in the rest of the economy fell less than 3 percent. Most of the latter decline occurred in trade and transportation and can be tied to a dropoff in agricultural marketings. The year 1935 seems to have been one of recovery. Note that factory output, though quite small, is estimated to grow each year.

Yeh's estimates can be supplemented with additional data on railroad ton-mileage, trade through China's Imperial Maritime Customs, and fixed

[20]These estimates include Manchuria, which was under Japanese rule almost the entire period. In the mid-1930's Manchuria contributed about 10 percent of China's GDP. We believe that the inclusion of Manchurian output in the figures in table 5 induces little bias in our overall quantitative assessment of changes in the economy of China proper over this period. First, for the slightly longer period 1930–1936, Kang Chao (1979, p. 258) estimates that GDP in Manchuria grew at less than 1 percent per annum. And second, although manufacturing output in Manchuria grew at a slightly faster rate than the national average (a consequence of the national industrialization program carried out under the Japanese), manufacturing output in China proper increased in every year between 1932 and 1936, except 1933 in which there was a modest decline of 1 percent. Over this five-year period, manufacturing output in China proper grew a healthy 27.2 percent. Estimates of manufacturing output are based on data contained in K.C. Yeh, 'Capital Formation in Mainland China: 1931–1936 and 1952–1957' (Ph.D. Dissertation, Columbia University, 1964, p. 225). Independently arrived at estimates of John Chang, *Industrial Development in Pre-Communist China* (Chicago, 1968, pp. 60–61 and 103) imply slightly faster growth of industrial production in China proper between 1931 and 1936.

Table 5

Sectoral output, 1931–1936 (billion 1933 yuan).[a]

| | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|
| Agriculture | 18.01 | 18.97 | 18.83 | 16.59 | 18.19 | 19.35 |
| Manufacturing | 2.94 | 2.94 | 2.95 | 2.82 | 2.93 | 3.16 |
| (by factories) | 0.66 | 0.72 | 0.73 | 0.77 | 0.83 | 0.96 |
| Transportation and communications | 1.61 | 1.70 | 1.68 | 1.50 | 1.67 | 1.65 |
| Trade | 2.82 | 2.72 | 2.72 | 2.53 | 2.66 | 2.82 |
| Construction | 0.40 | 0.41 | 0.44 | 0.44 | 0.46 | 0.49 |
| Total GDP | 28.57 | 29.47 | 29.46 | 26.90 | 29.09 | 30.95 |

[a]Source: K.C. Yeh, 'China's National Income, 1931–1936', in: *Modern Chinese Economic History* edited by Chi-ming Hou and Tzong-shian Yu (The Institute of Economics, Academia Sinica, Taipei, Taiwan, p. 98).

Table 6

Shipments by rail and through Maritime Customs.[a]

| | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|
| | *Railroads* (in 10,000's) | | | | | |
| Total tonnage | 2,423 | 2,561 | 2,620 | 2,983 | 2,992 | 3,435 |
| Ton-mileage | 445.8 | 445.6 | 477.1 | 626.7 | 648.9 | 648.9 |
| | *Maritime Customs* (in million 1926 yuan) | | | | | |
| Overseas | 353.2 | 261.1 | 323.7 | 308.1 | 329.1 | 325.9 |
| Inter-treaty port | 391.6 | 568.0 | 488.8 | 531.4 | 517.1 | 497.1 |
| Total | 744.7 | 829.1 | 812.5 | 839.5 | 846.2 | 823.0 |

[a]Sources: The railroad data were taken from Yen Chung-ping, *Chung-kuo chin-tai ching-chi shih t'ung-chi t'zu-liao hsuan-chi* (Peking, 1955, pp. 211–212). They are for China's state-owned railroads, which were located almost entirely in China proper. The data on the trade through Maritime Customs were based on annual trade reports published by China's Imperial Maritime Customs.

capital formation. The first two, both being good signals of the level of commercial activity during the 1930s, are reported in table 6. Railroad transport, measured either in terms of ton-mileage or total tonnage, increased at an annual rate in excess of 7 percent. This increase was primarily a consequence of increases in shipments of manufacturing and mining products and, to a slightly lesser extent, agricultural goods. Maritime Customs data, on the other hand, record the value of overseas exports and the inter-treaty-port trade earmarked for domestic consumption. Although China's overseas exports were much lower during this period than they had been throughout the late 1920's (this is part of Friedman and Schwartz's boon), the inter-treaty-port trade increased rapidly and helped to maintain total shipments through Maritime Customs at their pre-1931 level. Throughout much of the early

Table 7

Modern-oriented fixed capital formation (million 1933 yuan).[a]

| | 1931 | 1932 | 1933 | 1934 | 1935 | 1936 |
|---|---|---|---|---|---|---|
| National | 843 | 865 | 1034 | 1271 | 1287 | 1398 |
| China proper | 681 | 704 | 741 | 741 | 761 | 873 |
| Manchuria | 162 | 161 | 293 | 530 | 526 | 525 |

[a]Source: Thomas Rawski, 'Economic Growth and Integration in Prewar China', Discussion Paper No. 5 (University of Toronto–York University, Joint Center on Modern East Asia, February 1982, p. 13).

twentieth century overseas export growth for China proper had barely exceeded 1 percent per annum, while the inter-treaty-port trade increased at an annual rate in excess of 6 percent in 1900–1936 and at a slightly higher rate in the post-WWI period. The inter-treaty-port trade included all major agricultural and manufactured goods, chief among which were (measured as a percentage of the total value of trade in 1936): cotton textiles, 26.8 percent; grain, 10.8 percent; tung oil, 7.8 percent; tobacco products, 6.8 percent; cotton, 5.5 percent; and coal, 3.5 percent.[21]

Finally, in table 7 we report Thomas Rawski's estimates of 'modern oriented fixed capital formation'. Despite a reduction in new foreign investment and overseas remittances to China after 1931, Rawski's series shows no collapse in investment. In fact, capital formation in China proper, almost all of it private, increased in every year but 1934, growth averaging slightly in excess of 5 percent per annum for the five years. This experience can be contrasted with that in the United States, where by 1933 investment had fallen to approximately one-tenth of its levels just four years earlier.[22]

Historical data such as these obviously contain some margin of error. Nonetheless, the various estimates we report are much more consistent with the view that the Chinese economy weathered the external shocks of the 1930's remarkably well and that there was no contraction in economic activity than with the alternative view that these same shocks were the source of severe economic duress. The evidence in support of our interpretation is especially strong for the urban and modern sector which was most closely linked with the international economy and dependent on the banking system we have described.

[21]Han Ch'i-tung, *Chung-kuo pu-chi mao-yi t'ung-chi* (Peking, 1951).

[22]Investment data for the United States are taken from *The Statistical History of the United States from Colonial Times to the Present*, p. 143.

## 6. Government intervention in foreign exchange and 'monetary reform'

In October 1934 the government of China enlisted the resources of three major banks, one being a government owned bank and the other two being banks in which it owned shares, in an attempt to arrest the appreciation of the yuan by pegging the value of the Chinese yuan in terms of foreign paper currencies. Simultaneously banks were permitted to keep the yuan convertible into silver. Since the international price of silver was rising at the time, this plan was a questionable one because it sought a system that seemed to violate the 'law of one price'. For if successful, the yuan would be worth less in exchange for foreign currencies than it would be in terms of silver, creating arbitrage profits for people who bought yuan for foreign exchange, redeemed yuan for silver, than sold the silver for foreign exchange. In order to thwart these arbitrage possibilities, the government simultaneously imposed a 10 percent tax and a variable 'equalization charge' on exports of silver. In addition to enforcement problems, the task of setting an equalization fee on silver exports just sufficient to thwart the arbitrage possibilities required continual adjustment of the charge in response to alterations in the international price of silver and of foreign currency. In practice, the equalization charge adjusted too slowly to eliminate the potential arbitrage profits and, in fact, was not altered after April of 1935. Even assuming that the export tax was collected, which often it wasn't, the structure of prices in early 1935 seems to have offered substantial arbitrage profits to cashing in Chinese yuan and exporting silver from China. Not surprisingly, the period after October 1934 until the monetary reform of November 1935 is one in which the most rapid drain of silver from China seems to have occurred.[23] There were other fundamental forces impelling silver to leave China, but the government's intervention in the foreign exchange market added to them.

In November 1935 the Nationalist government nationalized the silver stock and mandated that banks no longer convert notes and deposits into silver. At least in the short run the government would profit from this action. Not only would the Nationalist government be the beneficiary of the capital gains associated with the rising international price of silver,[24] but, henceforth, it

[23] In this regard, an agreement by bankers in April of 1935 with the government not to export silver under any conditions appears to have had only a marginal influence on the outflow of silver. All that changed was how silver left China. In the last six months of 1934 silver stocks in Shanghai banks declined from 562.6 million yuan to 350.2 million, implying a net outflow of 210 million yuan. Estimated total net silver exports in 1934 were 280 million yuan. By comparison, in 1935 estimated total net silver exports were 292 million yuan, while silver stocks in Shanghai banks remained roughly constant through November. Monthly data on silver stocks in Shanghai banks can be found in issues of *Chung-yang yin-hang yue-pao* for these years.

[24] According to the Report for the Fiscal Year, 1934–1935, put out by the Ministry of Finance in 1936, government banks expected to mobilize about one billion ounces of silver (with a value of 1.2 billion yuan) through these actions. This silver was to be paid for in national currency.

would be relieved of the restrictions that are placed on government finance by a financial system that is obeying a commodity standard.[25]

## 7. Conclusion

We believe that the U.S. silver purchase program did not set off a chain of bad economic events which eventually forced China off silver and onto a fiat standard. The U.S. silver purchase program undoubtedly did help cause the fall in the Chinese price level, as silver became more valuable internationally in terms of commodities. But the evidence points against any massive disruptions in real economic activity as having resulted from the price level fall. The capital gains accruing on China's silver stock seems to have been largely the 'unalloyed boon' that was alluded to by Friedman and Schwartz and that was predicted by the analysis of Adam Smith. The Chinese monetary system was driven off silver by its government, which wanted to increase its share of that boon and which also perhaps foresaw that in coming years it would be easier to issue debt with low rates of returns if it could prevent competition from banks offering high-yielding low-denomination assets in the form of bank notes convertible into silver.[26]

In defense of the view that the U.S. silver purchase policy drove China off of silver and onto a fiat standard which lay vulnerable to eventual hyperinflation, it could be pointed out that the late thirties witnessed policies very different than the ones we described before 1935. After November 1935 the Nationalist Government ran large net-of-interest deficits and resorted more and more to monetizing them. Government debt ceased to be 'real bills' and China's currency ceased to be backed by either silver or 'real bills'. If these policies of the late thirties are regarded as inevitable so that private agents should readily have foreseen them, then our interpretation of the observations before November 1935 is seriously undermined because the 'backing' view of the value of money which it incorporates relies so heavily on the assumption of rational expectations. However, in interpreting historical data it is always important to keep in mind the distinction between 'perfect foresight' and 'rational expectations' and to attempt to reconstruct what could reasonably have been expected at a given moment in history to have occurred in the future. Political and economic events were moving swiftly and in unprecedented ways in China in

[25]See the articles in the *Asian Monetary Monitor* for a description of the subsequent hyperinflation.

[26]In 1945, H.H. Kung, China's Minister of Finance, in fact, remarked: 'When Japan invaded China in 1937, China's monetary system was prepared for the emergency... The new system enabled the government to rely on the increase of bank credit as a means of emergency war finance.' See H.H. Kung, 'China's Financial Problems', *Foreign Affairs* 22 (January 1945, pp. 222–223).

the 1930's, creating challenges for anyone who seeks to interpret these events with a model in which people act on their expectations about the future.

## References

Asian Monetary Monitor, The Chinese hyperinflation, Parts I, II, and III, Sept.–Oct. 1977, Nov.–Dec. 1977, and Jan.–Feb. 1978.

Brandt, Loren, 1985, Chinese agriculture and the international economy, 1870's–1930's: A reassessment, Explorations in Economic History 22, May, 168–193.

Brandt, Loren, forthcoming, Commercialization and agricultural development: Central and eastern China, 1870–1937 (Cambridge University Press, Cambridge).

Chao, Kang, 1979, The sources of economic growth in Manchuria: 1920–1941, in: Chi-ming Hou and Tzong-shian Yu, eds., Modern Chinese economic history (Institute of Economics, Academia Sinica, Taipei, Taiwan) 255–263.

Chinese Yearbook, 1935–36 and 1936–37 (Commercial Press, Shanghai).

Ch'uan-kuo yin-hang nien-chien, 1934, 1935, 1936, and 1937.

Chung-yang yin-hang yue-pao, Selected issues, 1931–1936.

Friedman, Milton, 1960, A program for monetary stability (Fordham University Press, New York, NY).

Friedman, Milton, 1968, The role of monetary policy, American Economic Review 58, 1–17.

Friedman, Milton and Anna Schwartz, 1963, A monetary history of the United States, 1867–1960 (Princeton University Press, Princeton, NJ).

Friedman, Milton and Anna Schwartz, 1986, Has government any role in money?, Journal of Monetary Economics 17, 37–62.

Hamilton, Alexander, 1795, Second report on the public credit, January 16 and 21, 1795, in: Samuel McKee, ed., 1957, Alexander Hamilton's papers on public credit, commerce, and finance (The Liberal Arts Press, New York, NY).

Kareken, J. and Neil Wallace, 1978, Deposit insurance and bank regulation: A partial-equilibrium exposition, Journal of Business 51, 413–438.

Lucas, R.E., Jr., 1972, Expectations and the neutrality of money, Journal of Economic Theory 4, 103–124.

Lucas, R.E., Jr. and Nancy Stokey, 1983, Optimal fiscal and monetary policy in an economy without capital, Journal of Monetary Economics 12, 55–93.

Merton, Robert, 1978, On the cost of deposit insurance when there are surveillance costs, Journal of Business 51, 439–452.

Rawski, Thomas, 1982, Economic growth and integration in prewar China, Discussion paper no. 5 (University of Toronto–York University, Joint Center on Modern East Asia, Toronto).

Rawski, Thomas, 1984, Estimates of China's money supply, 1910–1936, Unpublished paper.

Rockoff, Hugh, 1986, Institutional requirements for stable free banking, Cato Journal 6, 617–634.

Rolnick, A.J. and W.E. Weber, 1983, New evidence on the free banking era, American Economic Review 73, 1080–1091.

Rolnick, A.J. and W.E. Weber, 1984, The cause of free banking failures: A detailed examination, Journal of Monetary Economics 14, 267–291.

Rolnick, A.J. and W.E. Weber, 1985, Explaining the demand for free bank notes, Staff report no. 97 (Federal Reserve Bank of Minneapolis, MN).

Salter, Arthur, 1934, China and silver (Economic Forum, New York, NY).

Sargent, Thomas J. and Neil Wallace, 1982, The real bills doctrine vs. the quantity theory: A reconsideration, Journal of Political Economy 90, 1212–1236.

Sargent, Thomas J. and Neil Wallace, 1983, A model of commodity money, Journal of Monetary Economics 12, 163–187.

Smith, Adam, 1776, An inquiring into the nature and causes of the wealth of nations (Modern Library, New York, NY, 1937).

Tamagna, Frank, 1942, Banking and finance in China (Institute of Pacific Relations, New York, NY).

Taylor, J.B., 1979, Estimation and control of a macroeconomic model with rational expectations, Econometrica 47, 1267–1286.
Taylor, J.B., 1980a, Output and price stability: An international comparison, Journal of Economic Dynamics and Control 2, 109–132.
Taylor, J.B., 1980b, Aggregate dynamics and staggered contracts, Journal of Political Economy 88, 1–23.
U.S. Bureau of the Census, 1965, The statistical history of the United States from colonial times to present (Horizon Press, New York, NY).
Yeh, K.C., 1979, China's national income, 1931–1936, in: Modern Chinese economic history, 95–128.
Yen, Ch'ung-p'ing, 1955, Chung-kuo chin-tai ching-chi shih t'ung-chi t'zu-liao hsuan-chi (Scientific Press, Peking).
Young, Arthur, 1971, China's nation-building effort, 1927-1936 (Stanford University Press, Stanford, CA).